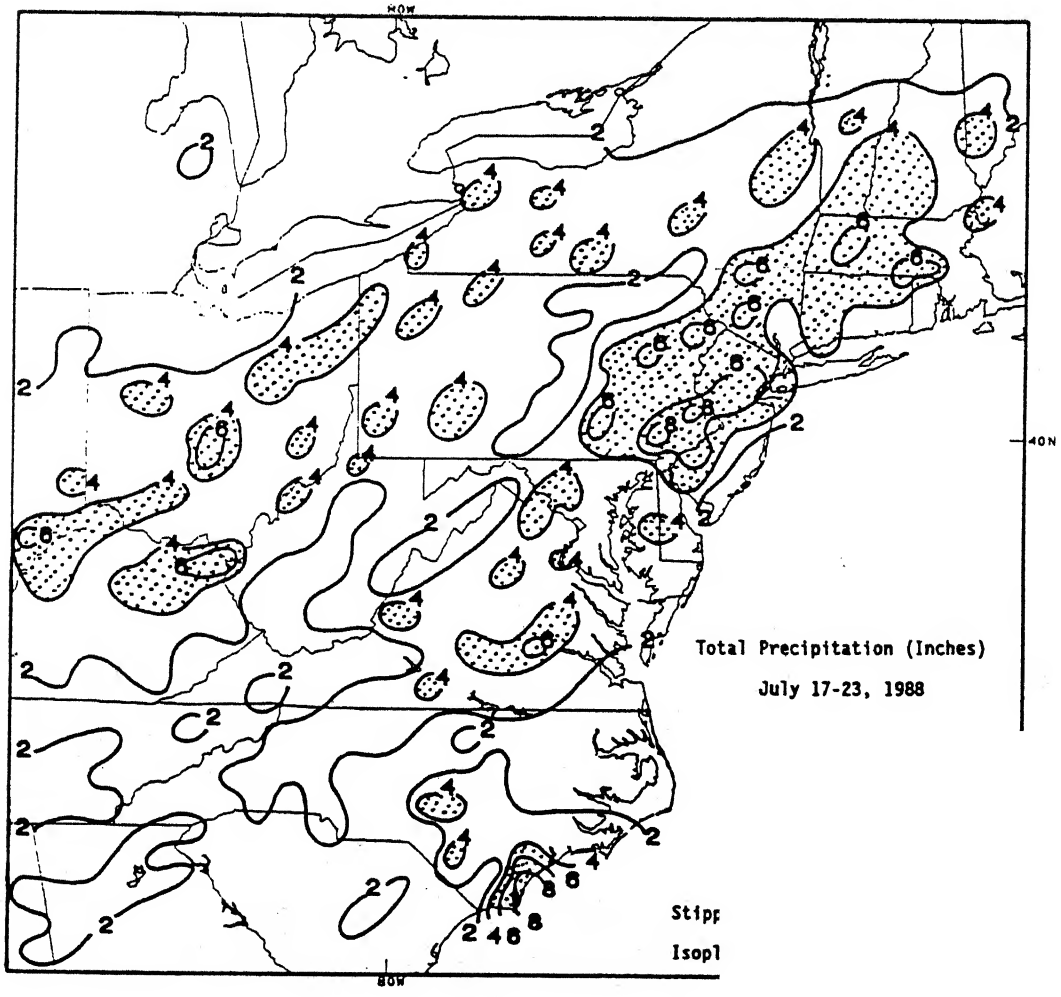
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

No. 88/30 Washington, DC July 23, 1988



WIDESPREAD SHOWERS AND THUNDERSTORMS ALONG A SLOW MOVING COLD FRONT BROUGHT BENEFICIAL PRECIPITATION TO MUCH OF THE OHIO VALLEY, MID-ATLANTIC, AND NEW ENGLAND REGIONS AS MANY STATIONS RECORDED MORE THAN FOUR INCHES OF RAINFALL. FOR REVIEWS ON THE

NOAA - NATIONAL WEATHER SERVICE -

WEEKLY CLIMATE BULLETIN

Editor:	David Miskus
Associate Editor:	Paul Sabol
Contributors:	Keith W. Johnson
	Vernon L. Patterson
Graphics:	Robert H. Churchill
	Robert P. Nester
	Richard J. Tinker

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

Highlights of major global climatic events and anomalies.
U.S. climatic conditions for the previous week.
U.S. apparent temperatures (summer) or wind chill (winter).
Global two-week temperature anomalies.
Global four-week precipitation anomalies.
Global monthly temperature and precipitation anomalies.
Global three-month precipitation anomalies (once a month).
Global twelve-month precipitation anomalies (every 3 months).
Global temperature anomalies for winter and summer seasons.
Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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Climate Analysis Center, W/NMC53
Attention: Weekly Climate Bulletin
NOAA, National Weather Service
Washington, DC 20233
Phone: (301)-763-8071

GLOBAL HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JULY 23, 1988
(Approximate duration of anomalies is in brackets.)

1. United States:

WARM, DRY CONDITIONS DIMINISH.

Abnormally warm conditions persisted in Utah, Nevada, and California with temperatures as much as 6.1°C (11.0°F) above normal, but temperatures moderated in the eastern two-thirds of the United States. Many stations in the eastern half of the Nation reported heavy rainfall, up to 233.9 mm (9.21 inches); however, many dry pockets remained. See U.S. Weekly Weather Highlights for additional details [19 weeks dry - 12 weeks warm].

2. Kazakh S.S.R.:

WARM SPELL ENDS.

Near normal temperatures prevailed across the Kazakh S.S.R. as the unusually warm conditions ended there [Ended at 9 weeks].

3. Northern Europe:

EXTENSIVE AREA IS UNUSUALLY WARM.

Temperatures averaged up to 7.2°C (13.0°F) above normal as unusually warm weather persisted in European Soviet Union and northern Scandinavia [4 weeks].

4. East Central China:

VERY HOT AND DRY IN REGION.

Light precipitation, generally less than 18.3 mm (0.72 inch), along with very high temperatures, up to 4.2°C (7.6°F) above normal, occurred across parts of eastern China [7 weeks dry - 4 weeks warm].

5. Bolivia and Paraguay:

LOW TEMPERATURES PREVAIL.

Very cold conditions, with temperatures as much as 5.9°C (10.6°F) below normal, persisted across the region [3 weeks].

6. China:

STORMS BRING HEAVY RAINS.

Typhoon Warren struck the south China coast and brought up to 251.0 mm (9.88 inches) of rain. Northwestern China experienced heavy rain with hail according to press reports [Episodal Events].

7. France:

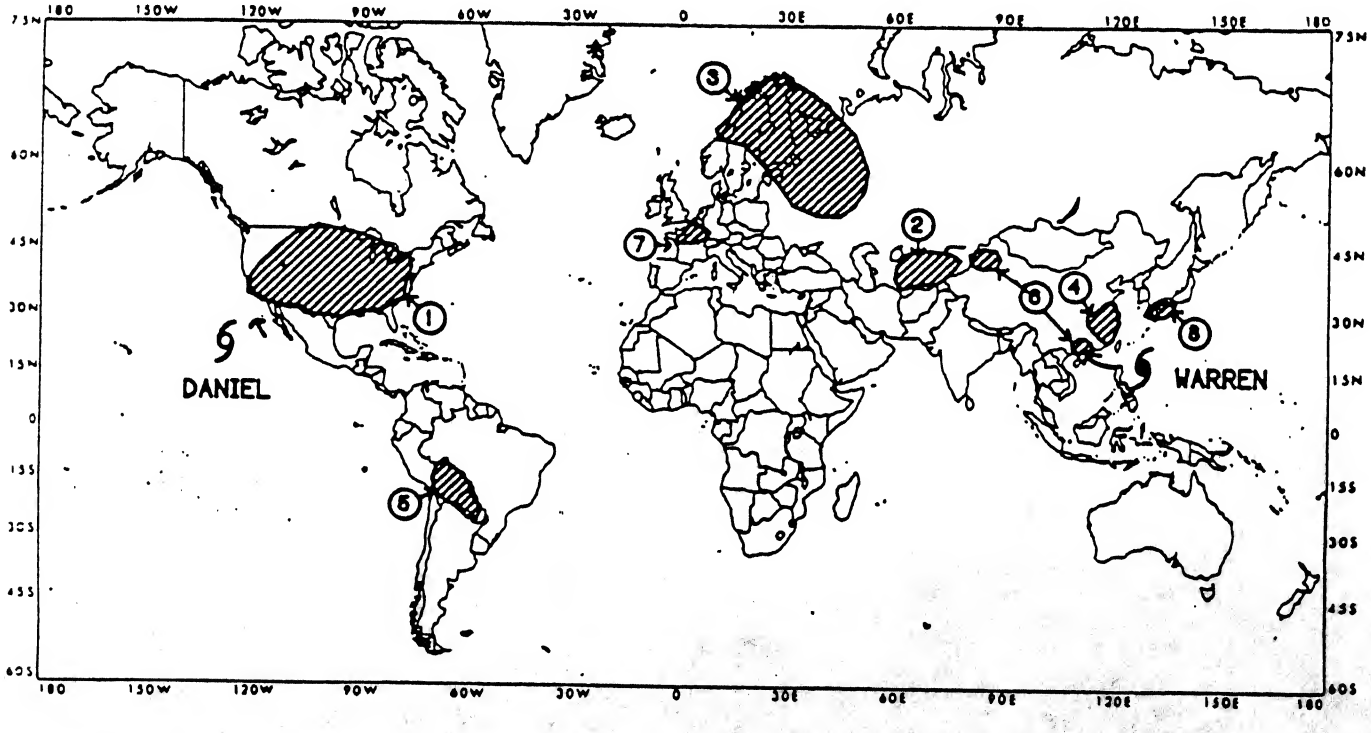
SEVERE WEATHER REPORTED.

The press reported that heavy rains with hail swept through parts of northern France and caused injuries and property damage [Episodal Event].

8. Japan:

PRESS REPORTS FLOODS.

As much as 189.6 mm (7.47 inches) of rain fell in central and western Japan with flooding reported in Hiroshima [Episodal Event].



Approximate locations of the major anomalies and events described above are shown on this map. See the other world maps in this Bulletin for current two-week temperature anomalies, four-week precipitation anomalies, and (occasionally) longer-term anomalies.

U.S. WEEKLY WEATHER HIGHLIGHTS

FOR THE WEEK OF JULY 17 THROUGH JULY 23, 1988

For the second consecutive week, significant and sometimes torrential precipitation provided additional short-term relief from the abnormally dry conditions of June and early July across much of the eastern half of the nation (see Table 1). Greatest rainfall totals occurred throughout New England, the Ohio Valley, the mid-Atlantic, along the Gulf Coast, in portions of the Southeast, and in parts of the central Great Plains (see front cover and Figure 1). According to the River Forecast Centers, weekly amounts of over four inches fell on the central Great Plains, specifically south-central Nebraska, south-central Kansas, southwestern Missouri, and northern Texas, while more than five inches was measured in eastern Louisiana, the western Florida panhandle, northern Alabama, south-central Tennessee, north-central and northeastern Kentucky, southern Indiana, south-central Ohio, east-central Virginia, eastern Pennsylvania, western New Jersey, southern New York, northern Connecticut, western Massachusetts, and the southern halves of Vermont and New Hampshire. Elsewhere, locally heavy precipitation was observed in parts of southeastern New Mexico, south-central Texas, and in central and southeastern Florida. Light to moderate amounts were confined to the remaining locations in the eastern two-thirds of the U.S., southern Arizona, and southeastern Alaska. Little or no precipitation was recorded throughout the western third of the country except in southern Arizona, and at a few stations in sections of east-central and southwestern Texas, west-central Missouri, and northeastern lower Michigan.

Temperatures moderated from the previous week in the eastern third of the nation as departures generally ranged between +2 to +4°F, however, in the Far West, unseasonably hot weather scorched most of the interior Pacific Coast (see Table 2). Temperatures averaged between 6-12°F above normal in the region, while highs exceeded 100°F in the desert Southwest, interior California and Oregon, and western Nevada (up to 118°F at Redding, CA on 7/20). In contrast, below normal temperatures covered the central third of the country as departures of -3 to -6°F prevailed from southwestern Texas northward to North Dakota (see Table 3). A few scattered locations in the area established new daily minimum temperatures during the week. The cooler weather, in combination with the rainfall, helped to lower the evaporative demand and replenish short-term moisture supplies in much of the unusually dry Ohio and Tennessee Valleys, mid-Atlantic, and New England regions. In Alaska, near-normal readings were common throughout the eastern portions, but the western third of the state reported departures up to +9°F.

TABLE 1. Selected stations with three and one-half inches or more precipitation for the week.

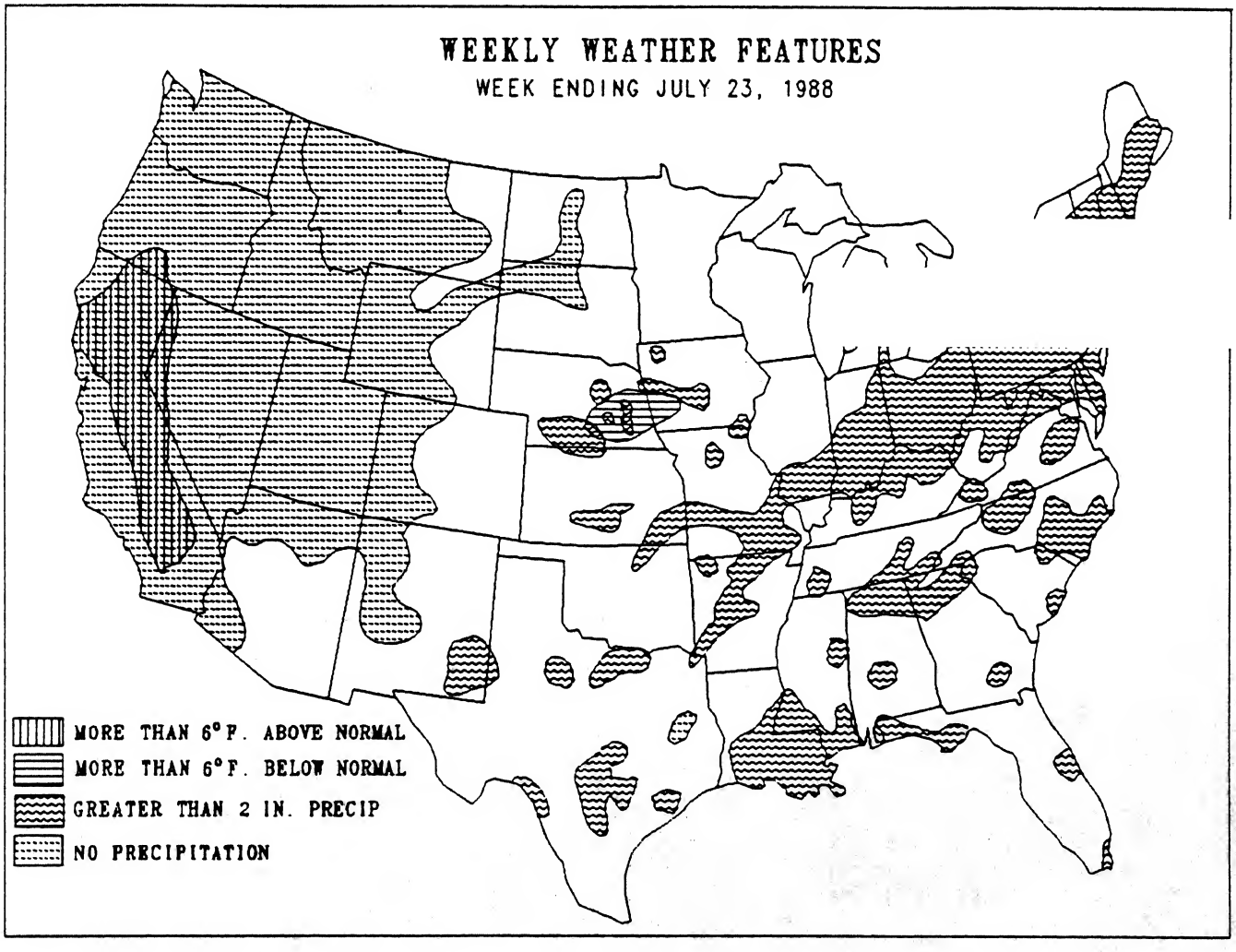
Wilmington, NC	9.21	Akron, OH	4.17
Wilmington, DE	7.09	Huntsville, AL	4.15
Newark, NJ	7.07	Cincinnati, OH	4.11
Pensacola, FL	6.67	Youngstown, OH	4.09
Columbus, OH	6.64	Belleville/Scott AFB, IL	4.07
Fayetteville, NC	6.41	Bradford, PA	4.07
Huntington, WV	6.20	Hartford, CT	4.06
New York/La Guardia, NY	5.86	San Antonio, TX	4.02
Philadelphia, PA	5.63	Little Rock, AR	3.86
Hickory, NC	5.61	Salisbury, MD	3.86
Richmond, VA	5.20	Apalachicola, FL	3.77
Bangor, ME	4.86	Portsmouth/Pease AFB, NH	3.69
Washington/Dulles, VA	4.85	Brunswick NAS, ME	3.68
New York/Kennedy, NY	4.76	Willow Grove NAS, PA	3.66
Parkersburg, WV	4.71	Utica, NY	3.59
Dayton/Wright-Patterson AFB,OH	4.56	Allentown, PA	3.58
Lebanon, NH	4.38	Syracuse, NY	3.53
Glens Falls, NY	4.26	Concord, NH	3.52
Buffalo, NY	4.20	Poughkeepsie, NY	3.52
Bridgeport, CT	4.20	Providence, RI	3.50
Columbus/Lockbourne AFB, OH	4.20		

TABLE 2. Selected stations with temperatures averaging greater than 4°F ABOVE normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Victorville/George AFB,CA	+10	89	Nome, AK	+6	57
Redding, CA	+ 9	93	Daggett, CA	+5	94
Fresno, CA	+ 9	91	Baltimore, MD	+5	82
Reno, NV	+ 9	79	Philadelphia, PA	+5	82
Bethel, AK	+ 9	64	Washington/Dulles, VA	+5	81
Sacramento, CA	+ 8	84	Wilmington, DE	+5	81
Bakersfield, CA	+ 7	92	Charleston, WV	+5	80
Medford, OR	+ 7	80	Allentown, PA	+5	79
San Fransisco, CA	+ 7	69	Portland, OR	+5	73
Glendale/Luke AFB, AZ	+ 6	98	Hancock/Houghton Co., MI	+5	70
Dover AFB, DE	+ 6	83	Seattle-Tacoma, WA	+5	70
McGrath, AK	+ 6	64			

TABLE 3. Selected stations with temperatures averaging greater than 4°F BELOW normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Barrow, AK	-6	34	Clovis/Cannon AFB, NM	-5	73
Wainwright, AK	-6	38	Springfield, MO	-5	74
Goodland, KS	-6	71	Topeka, KS	-5	74
Grand Island, NE	-6	71	Dodge City, KS	-5	76
North Omaha, NE	-6	72	Chanute, KS	-5	76
Concordia, KS	-6	74	Garden City, KS	-5	76
Midland, TX	-6	76	Joplin, MO	-5	76
Akron, CO	-5	69	Russell, KS	-5	76
North Platte, NE	-5	70	Gage, OK	-5	77
Norfolk, NE	-5	71	Carlsbad, NM	-5	78



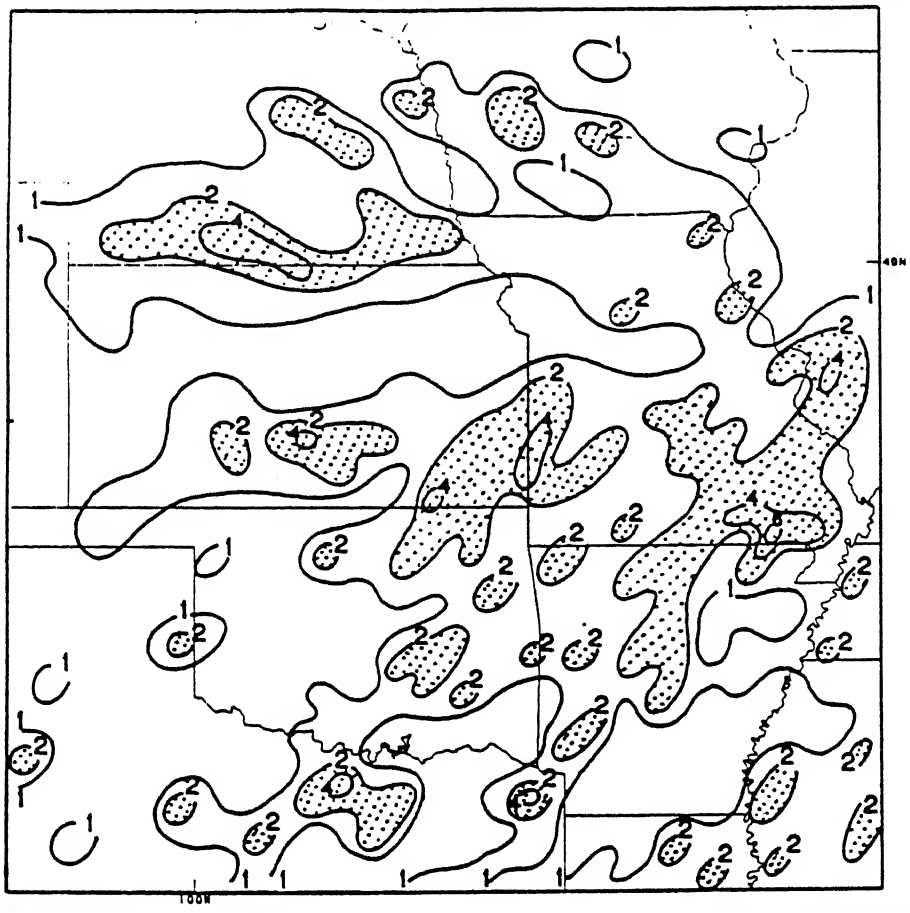
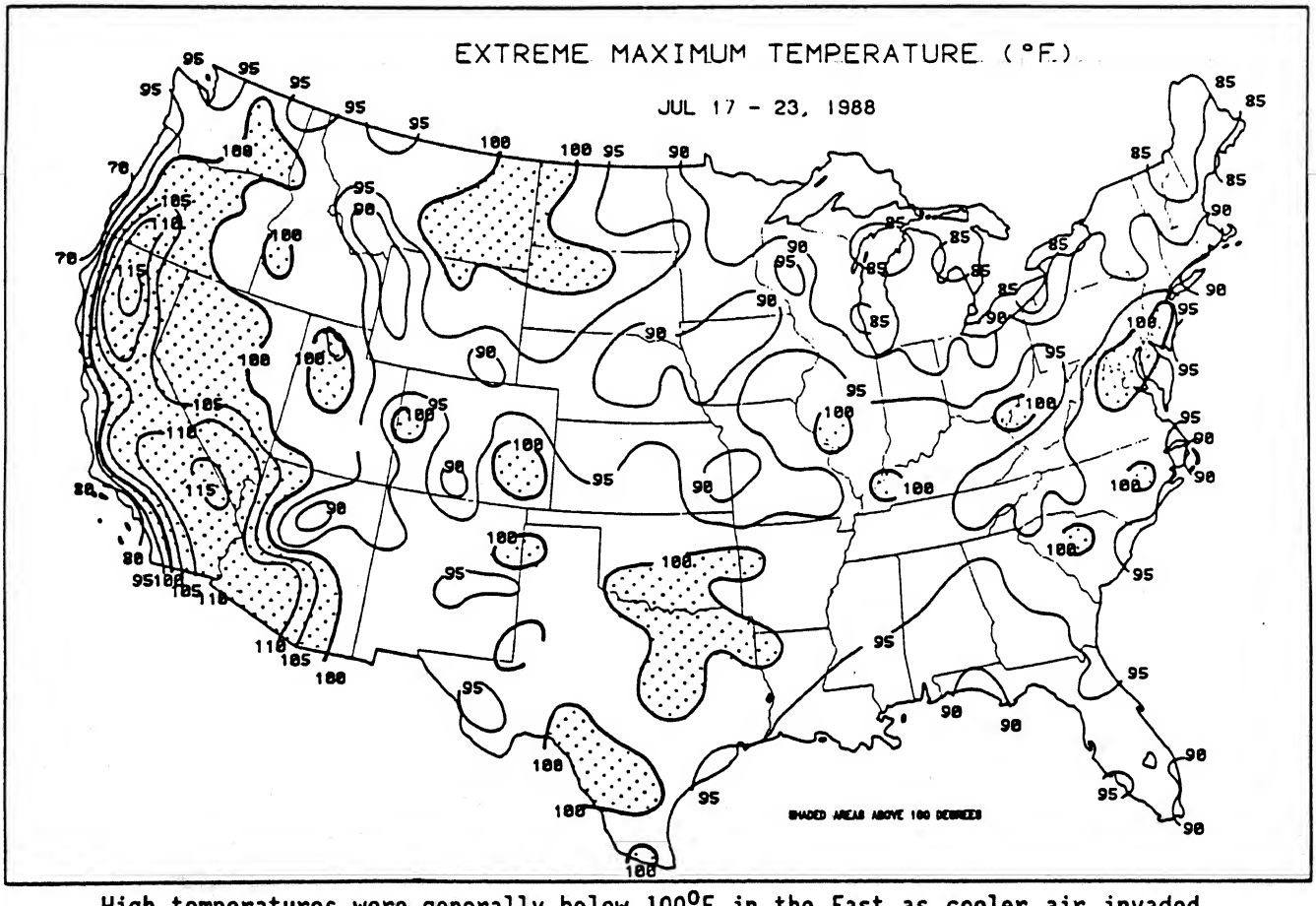
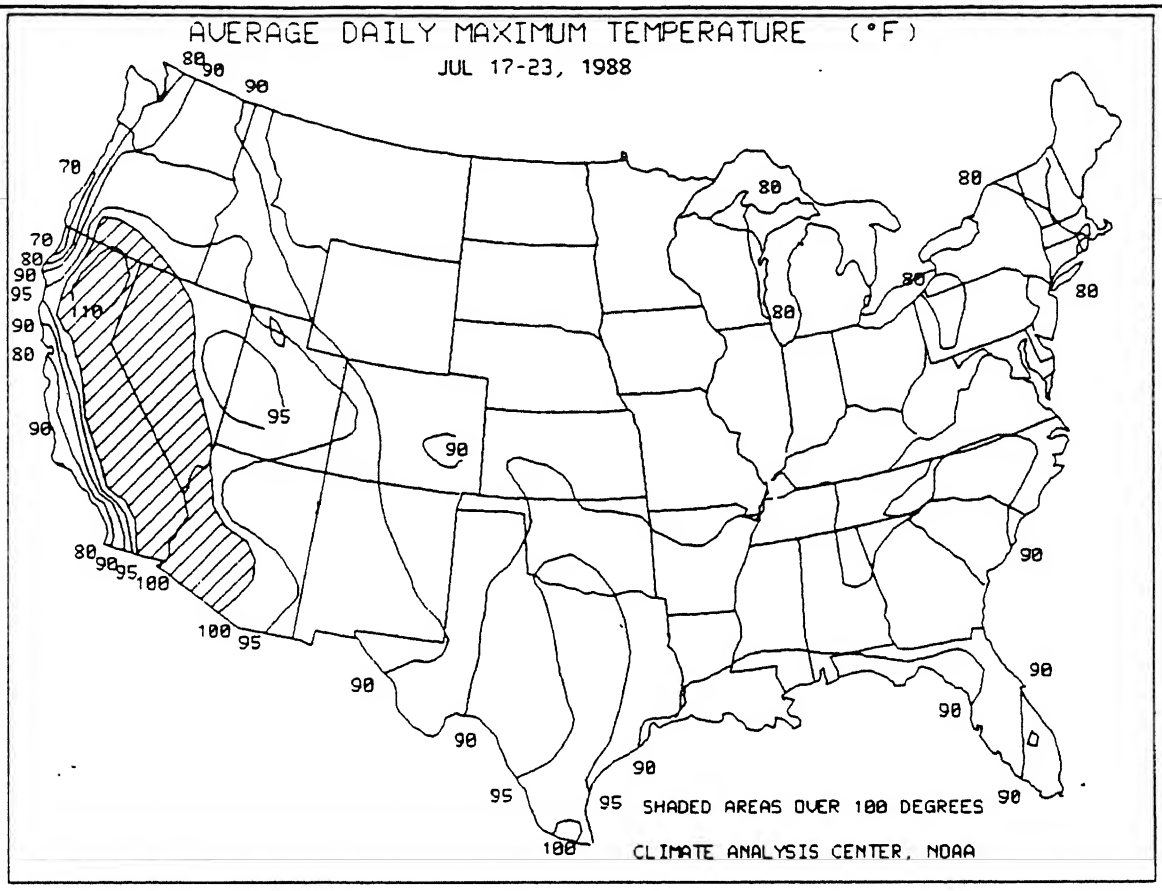


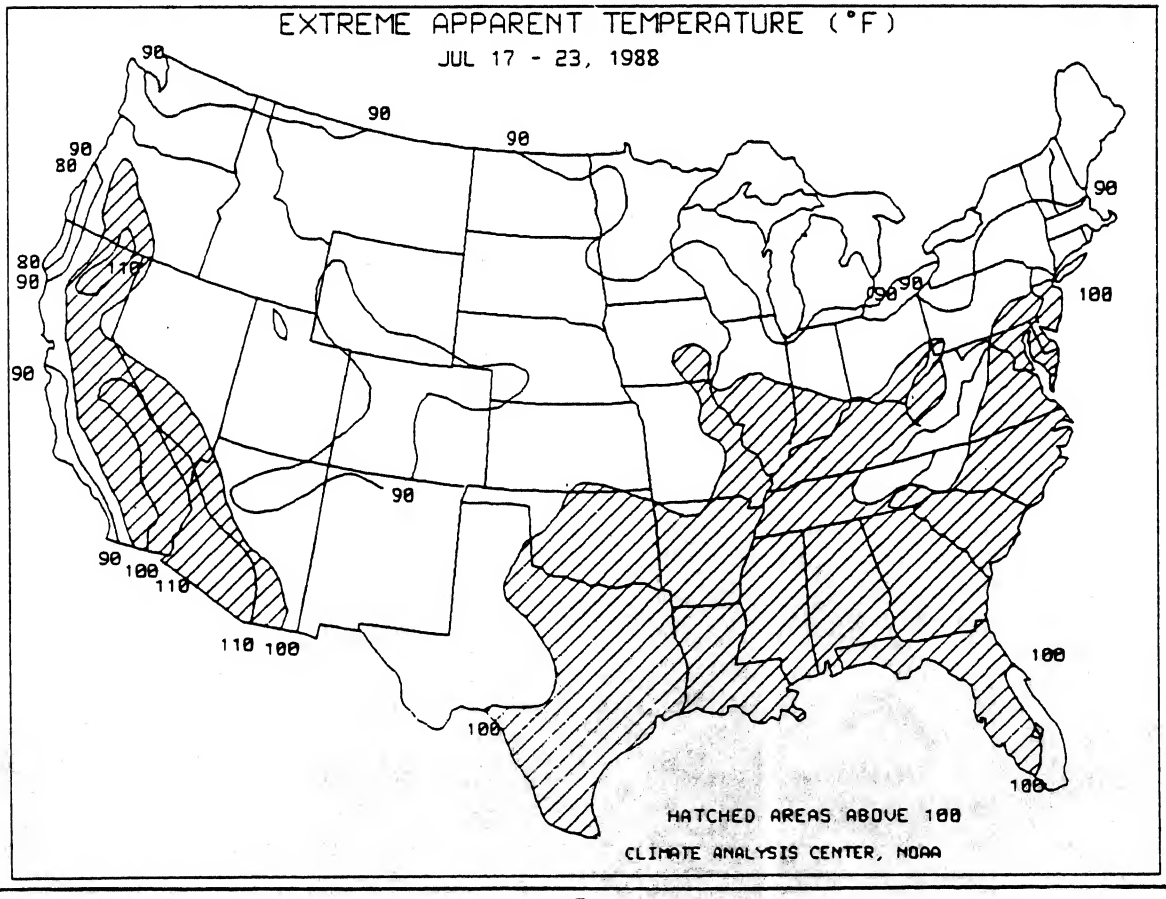
Figure 1. Total precipitation (inches) during 7/17-7/23/88. Stippled areas greater than 2 inches, and isopleths less than 1 inch not drawn. Heavy precipitation fell in parts of the central Great Plains and Midwest and areas farther to the east (see front cover), but missed large sections of the upper Midwest and northern Corn Belt.

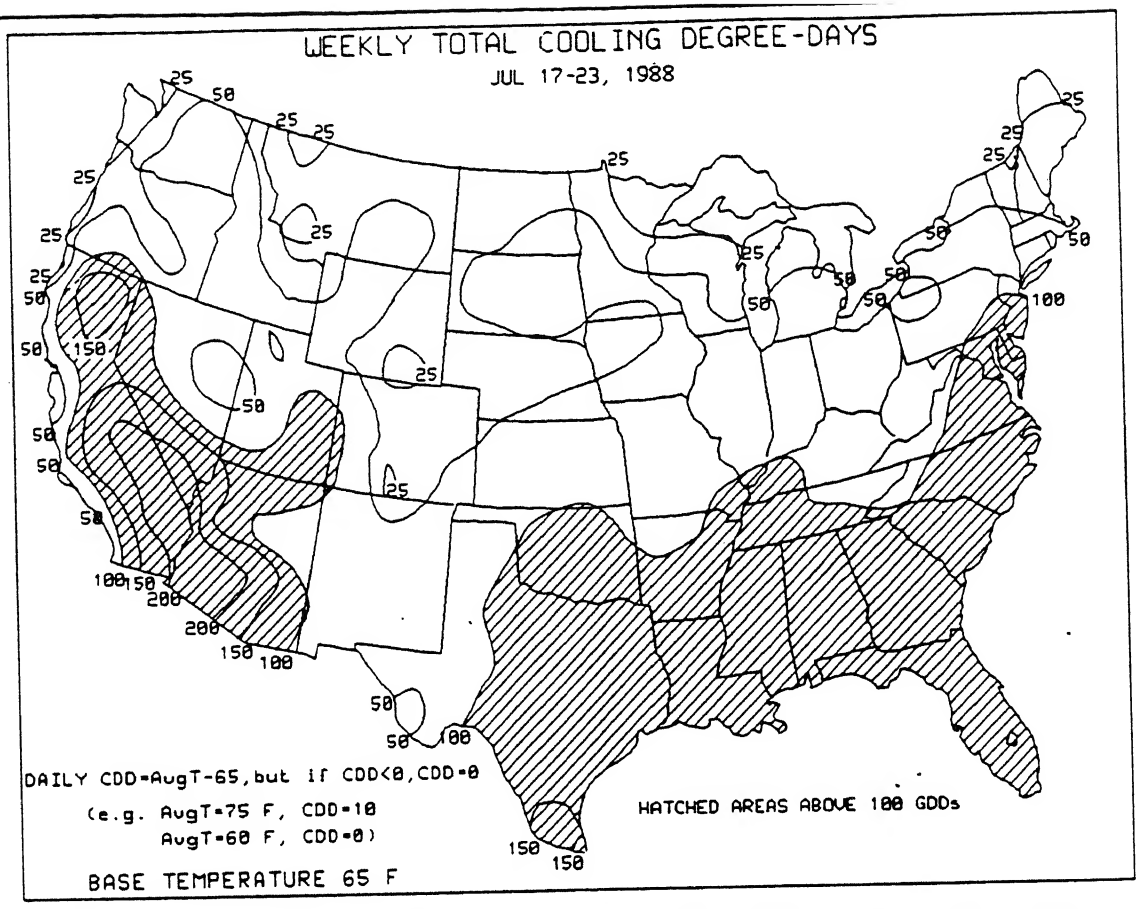


High temperatures were generally below 100°F in the East as cooler air invaded the area midway through the week, but unusually hot weather continued to scorch the Far West, especially the interiors of northern California and southern Oregon.

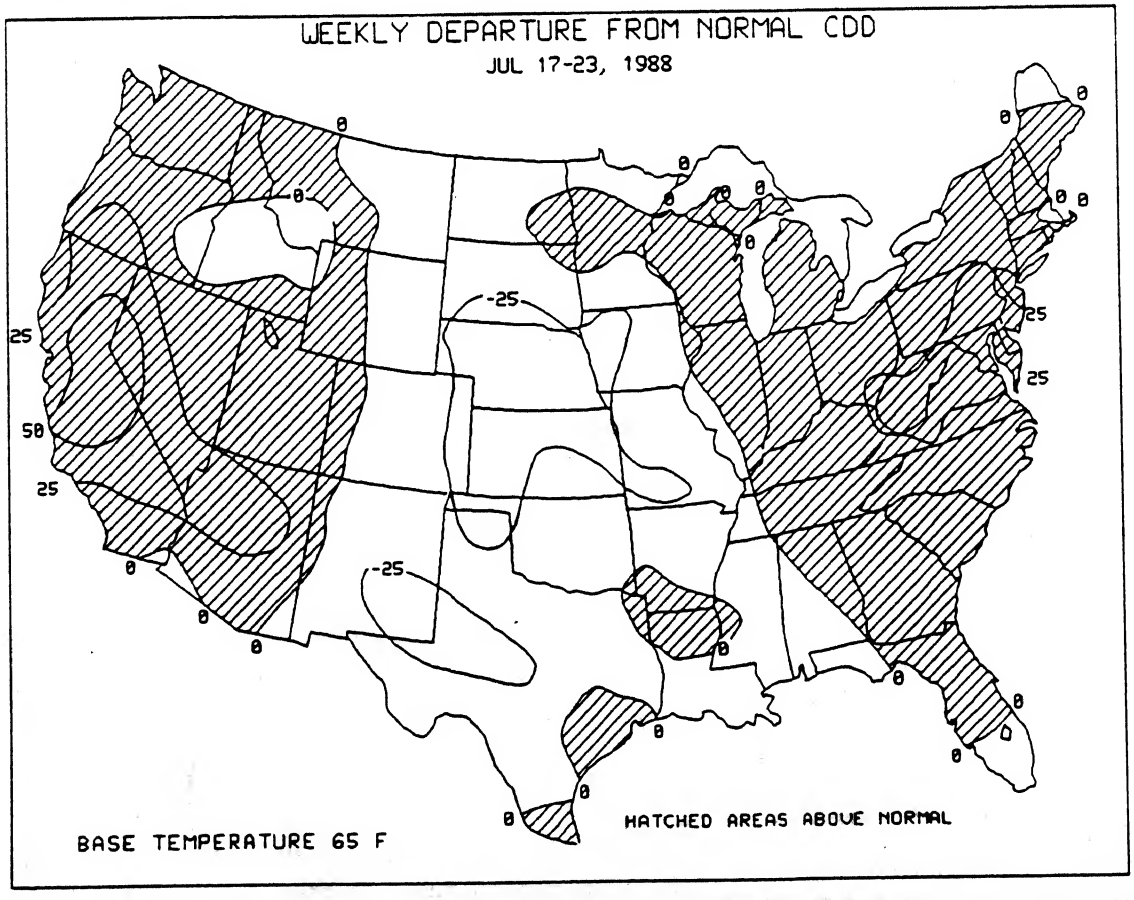


Maximum temperatures "only" averaged in the upper eighties and lower nineties across the eastern half of the nation and in the lower eighties throughout the northern Great Plains and upper Midwest, while highs exceeding 100°F was common in much of California and Nevada (top). Apparent temperatures over 100°F occurred early in the week in the Southeast and mid-Atlantic regions; interior California surpassed 110°F at least once (bottom).



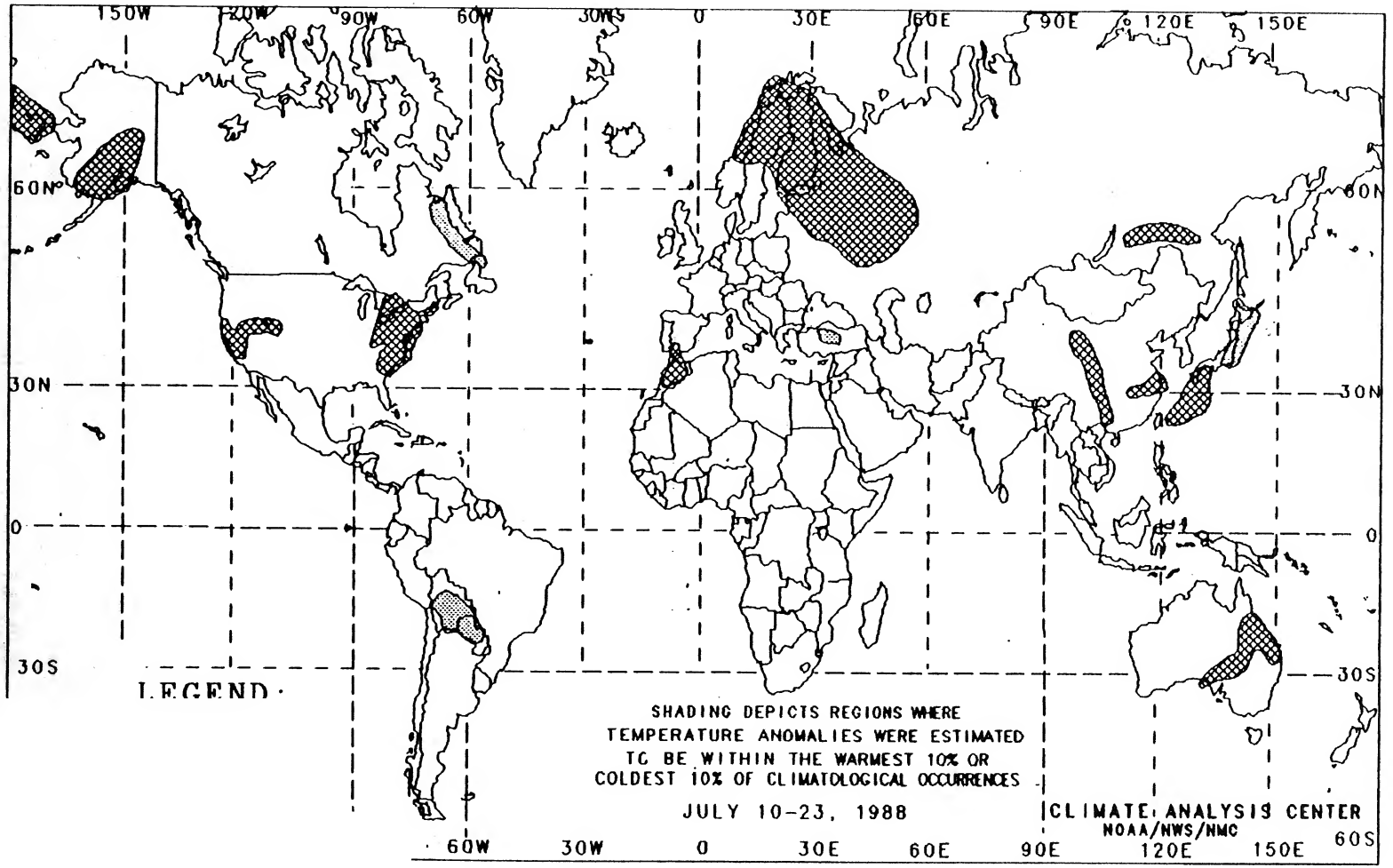


Weekly air-conditioning (CDD) demands were above normal along both coasts in response to warm conditions, while the mid-section of the nation experienced cooler weather and lower cooling degree day departures.



TEMPERATURE ANOMALIES

2 Week



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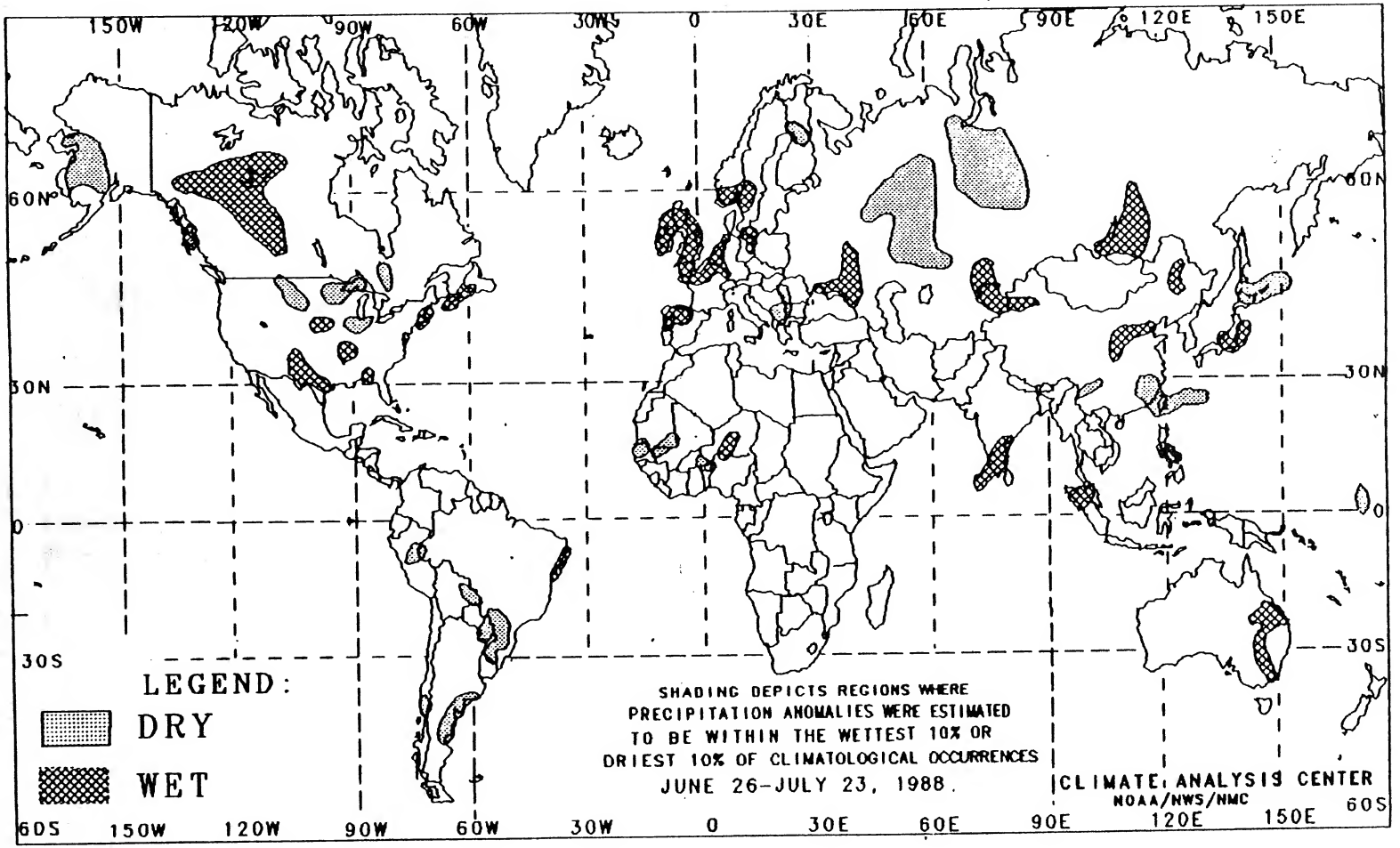
In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted

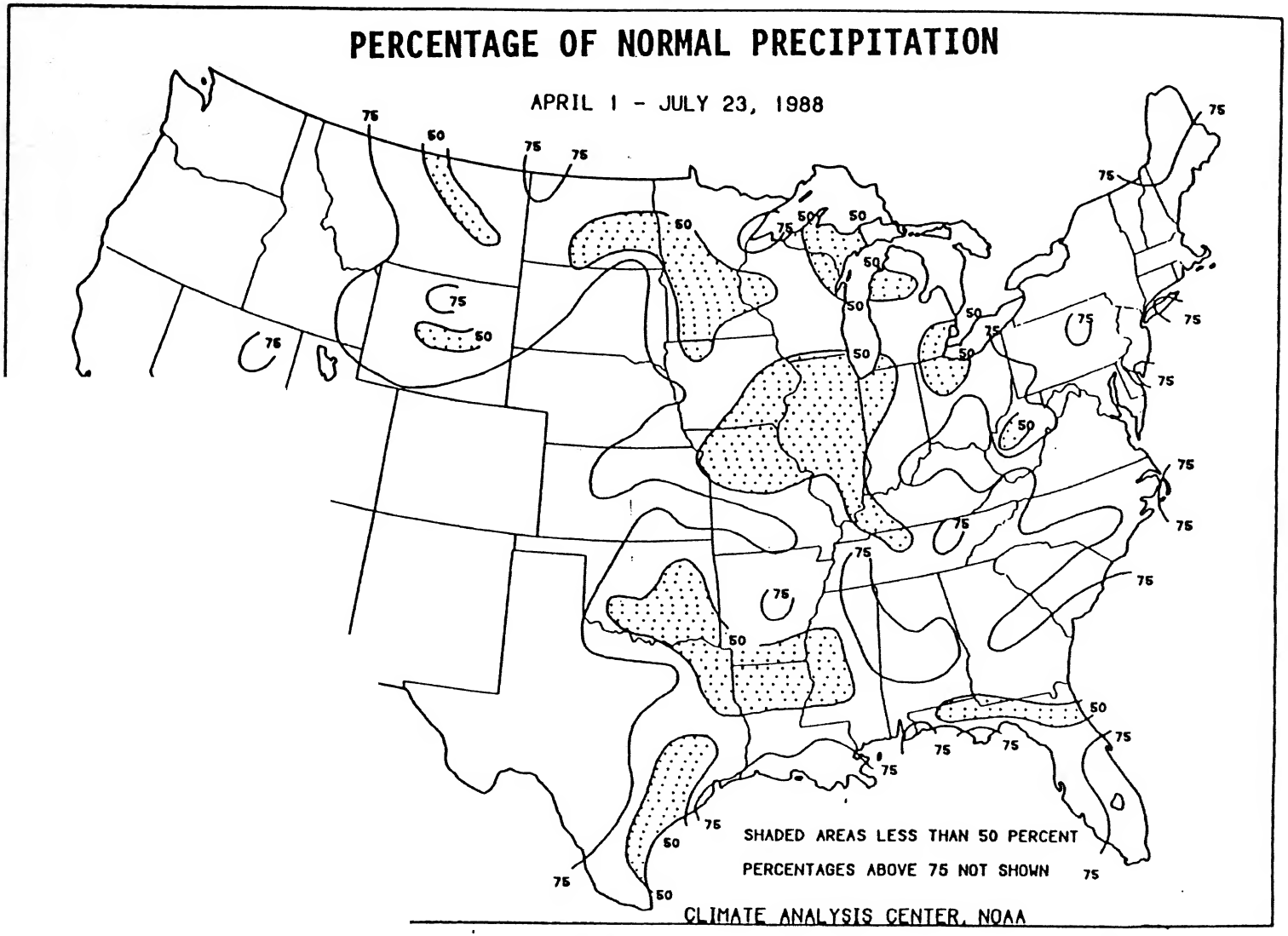
In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

UPDATE ON THE ABNORMAL DRYNESS ACROSS THE EASTERN HALF OF THE U.S.

The areas with less than half their normal precipitation had diminished last week (see Figure 1) as many locations recorded substantial rainfall over the past two weeks. (Compare Figure 1 with page 18 of the Weekly Climate Bulletin dated July 9, 1988). Most notably, the Ohio and Tennessee Valleys, the Gulf Coast, and a large majority of the Atlantic Coast have measured between 2-4 inches since July 10, with some stations reporting over 10 inches. Not all regions, however, received similar amounts as portions of the northern Great Plains, upper Midwest, northern Corn Belt, and lower Mississippi Valley generally observed under an inch of precipitation during the same period.



precipitation from April 1-July 23, 1988. Only contours of 75% or less shaded. With last week's heavy rains, the regions <50% shrank in the sippi Valleys.

Similarly, the regions with deficiencies of eight inches or more roughly corresponded to the 50% or less areas (see Figure 2). With the rainfall, the areal coverage of large departures in the eastern third of the nation was reduced. While the recent heavy precipitation has provided short-term relief to most sections of the U.S., additional rainfall is still needed to erase long-term deficits, especially with respect to reservoir levels, river traffic, and subsoil moisture.

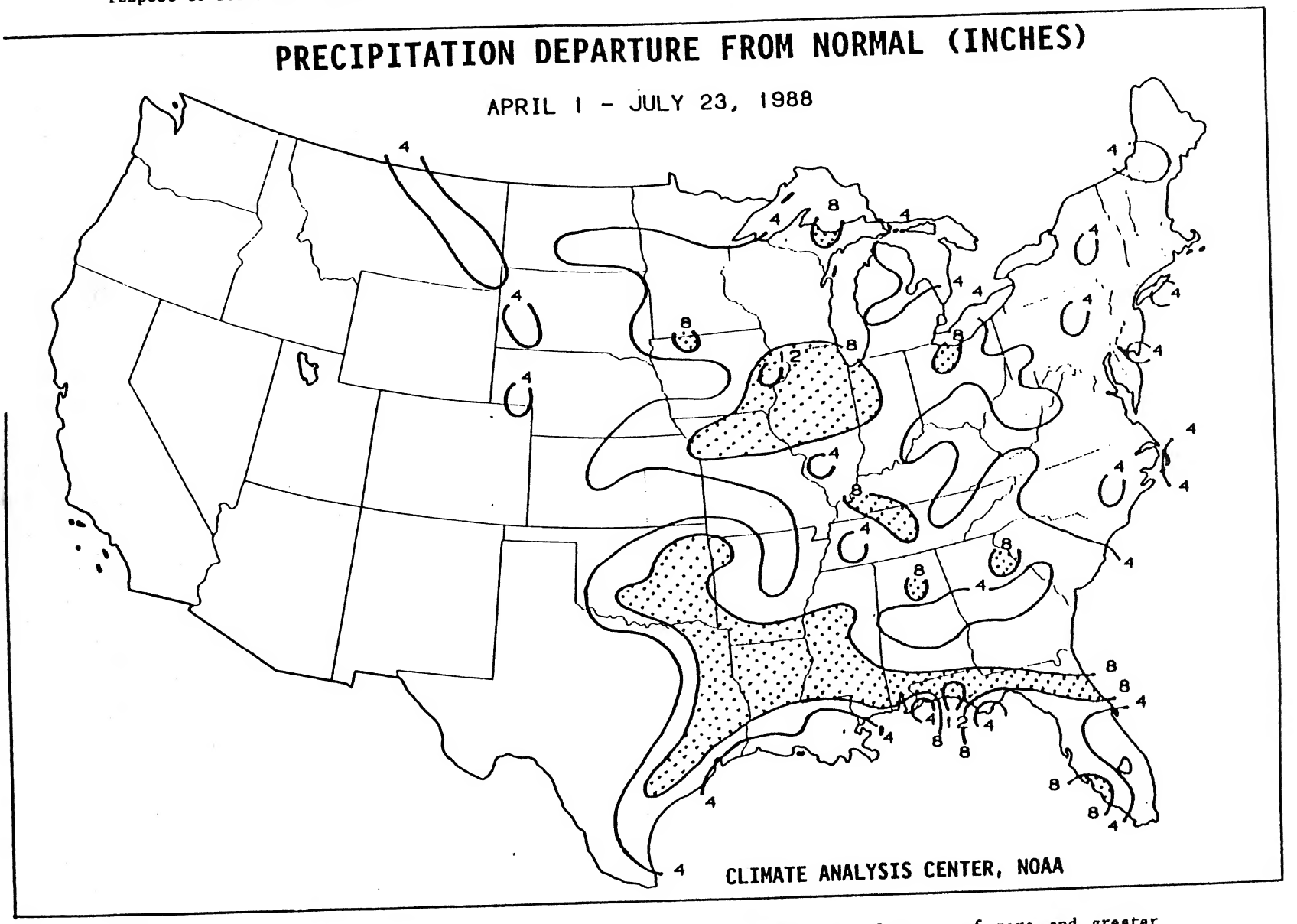


Figure 2. Precipitation departure from normal (inches) since April 1. Contours of zero and greater (surplus) are not shown, and deficits exceeding eight inches or more are shaded. Since many stations in the eastern half of the U.S. have received significant precipitation over the past two weeks, the areal coverage of large deficiencies has been reduced. A few exceptions to this are located in eastern Iowa and the northern portions of Missouri and Illinois.

SPECIAL CLIMATE SUMMARY

Climate Analysis Center, NMC
National Weather Service, NOAA

REVIEW OF THE 1988 INDIAN MONSOON SEASON

The 1988 Indian monsoon season (generally from June-September) is off to a much better start in comparison to last year's devastating failure of the rains, most notably in northern India and Pakistan (see Weekly Climate Bulletin dated 4/23/88). Since June 1, many areas have recorded well over 200 mm, including last year's drought-stricken states of Gujarat, Rajasthan, and Punjab in northwestern India and Orissa in southeastern India (see Figure 1). According to press reports, the rains have been a mixed blessing as near-epidemic outbreaks of diseases, spread by rainwater combining with garbage and sewerage, have seeped into many drinking wells and contaminated them, especially around New Dehli. Furthermore, excessive rains have flooded rivers and created mudslides in various portions of northeastern (Assam), northern (Kashmir and Himachal Pradesh), and western (Maharashtra) India, and in Bangladesh.

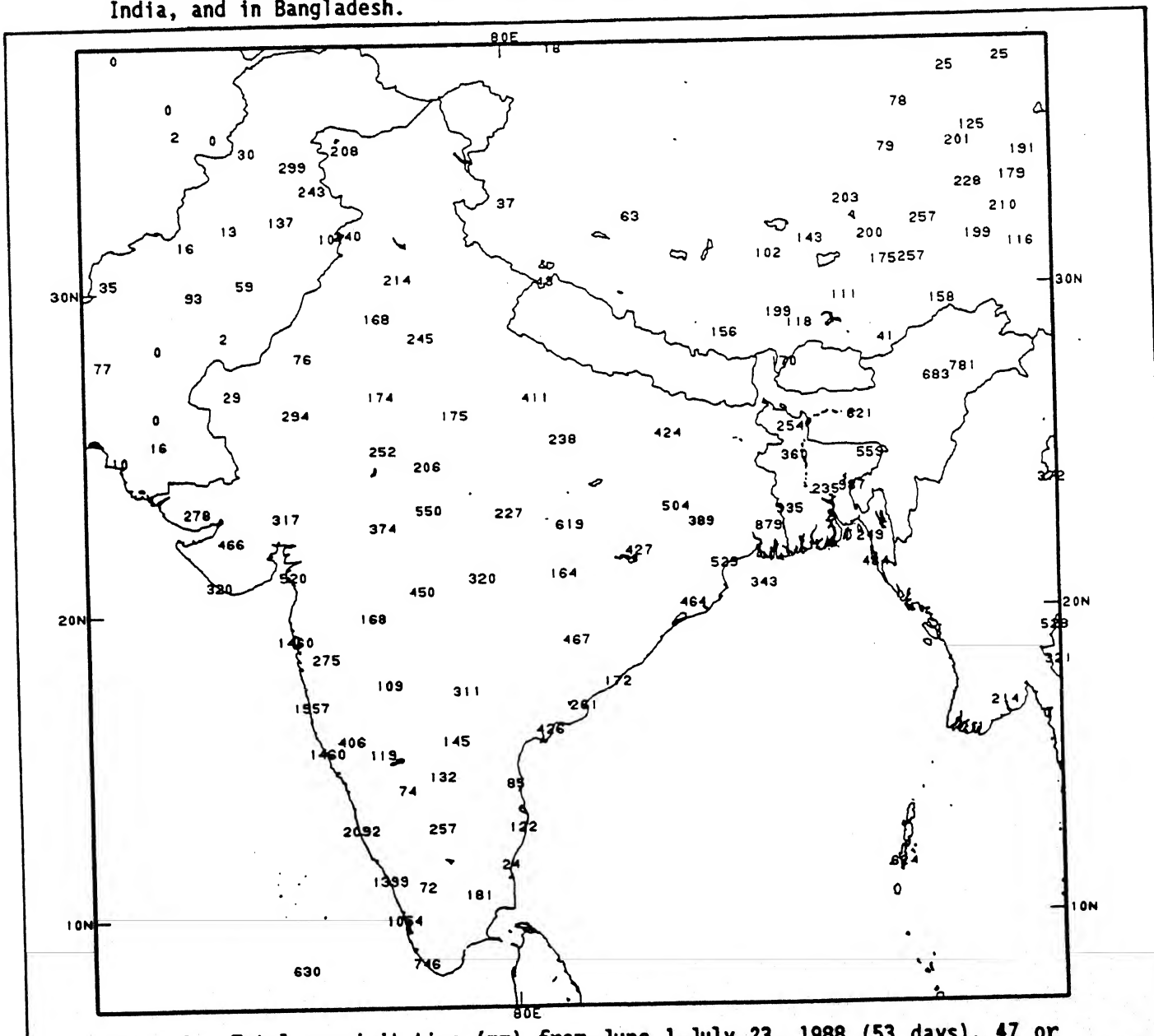


Figure 1. Total precipitation (mm) from June 1-July 23, 1988 (53 days). 47 or more days were required for a station to be included. So far, most locations in India and Bangladesh have received normal or excess precipitation.

This season most regions have experienced near to above normal precipitation as depicted in Figure 2. A few locations in central (Madhya Pradesh) and west-central (Maharashtra and Mysore) India had received under two-thirds of their normal amounts, however, Indian news reports noted that as of July 13, 26 of the country's 35 meteorological sub-divisions had observed excess or normal rainfall as compared to last year's value of 14.

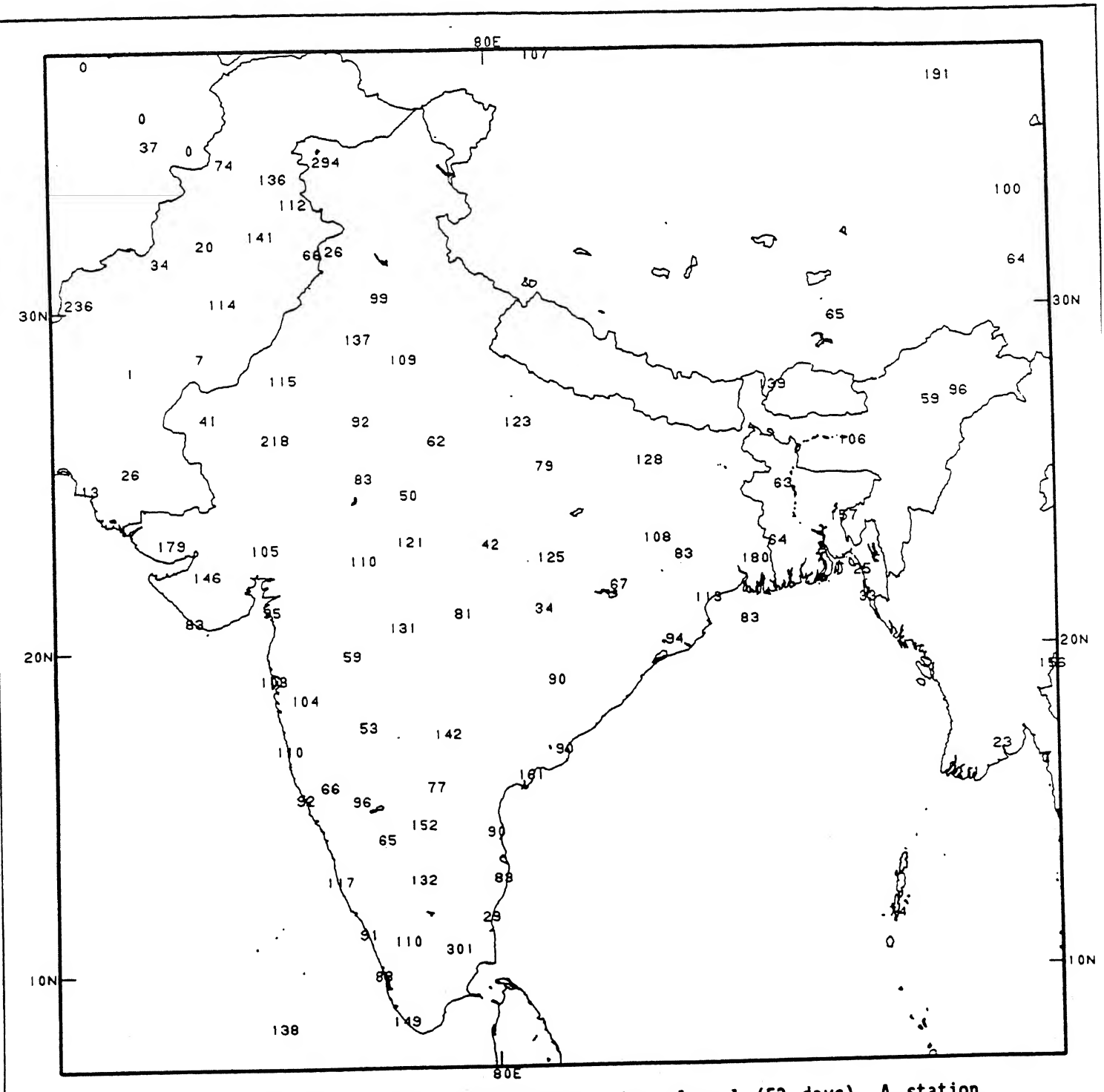


Figure 2. Percent of normal precipitation since June 1 (53 days). A station needed 47 or more days for inclusion. A large majority of India is experiencing excess rainfall this season.

SPECIAL CLIMATE SUMMARY

Climate Analysis Center, NMC
National Weather Service, NOAA

REVIEW OF THE 1988 AFRICAN SAHEL RAINY SEASON (JUNE-SEPTEMBER)

Since June 1, precipitation amounts have generally ranged between 150-250 mm in the western (eastern Senegal, southern Mali, Cote d'Ivoire, Burkina Faso, Togo, Benin), central (southern Niger, Cameroon), and eastern (central Ethiopia) regions (see Figure 1). Totals rapidly diminish above 15°N latitude, but this normally occurs. This year's rainy season, based upon the preliminary data and satellite images, appears to be improved as compared to last year's sub-normal season.

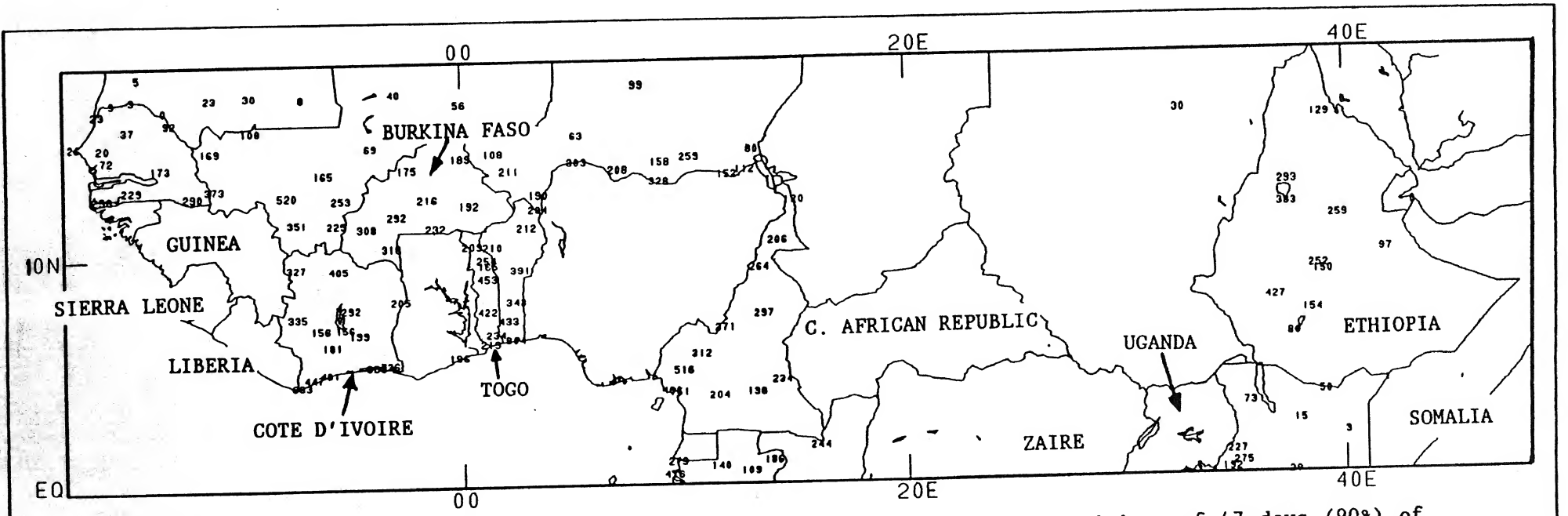


Figure 1. Total precipitation (mm) from June 1-July 23, 1988 (53 days). A minimum of 47 days (90%) of data were required for a station to be plotted. More than 200 mm have fallen at many locations in the western and central Sahel.

Many stations have reported near to above normal rainfall over the past 53 days in the western and central Sahel, especially along the Niger-Nigerian border, in southern Togo and Benin, southwestern Mali, western Burkina Faso, and northern Cote d'Ivoire (see Figure 2). In contrast, below normal precipitation was measured in much of Senegal, southern Mauritania, central Mali, southern Cote d'Ivoire, the northern portions of Togo and Benin, and central Cameroon; however, over 150 mm had fallen in the latter three regions as their normal amounts are rather large (>300 mm). In the east, Ethiopia has been variable, with some stations reporting near or above normal rainfall, and others recording less than two-thirds their normal precipitation. Based upon qualitative satellite (Meteosat) observations, it appears that the central sections of Chad and Sudan and the northern part of Nigeria had ample cloud (thunderstorm) activity over the past several weeks. Overall, rainfall this season has been better than in previous years, but some areas (e.g. Senegal, Mauritania) are experiencing unusually dry conditions. Continued timely rainfall will be needed throughout the upcoming weeks to ensure sufficient moisture reserves.

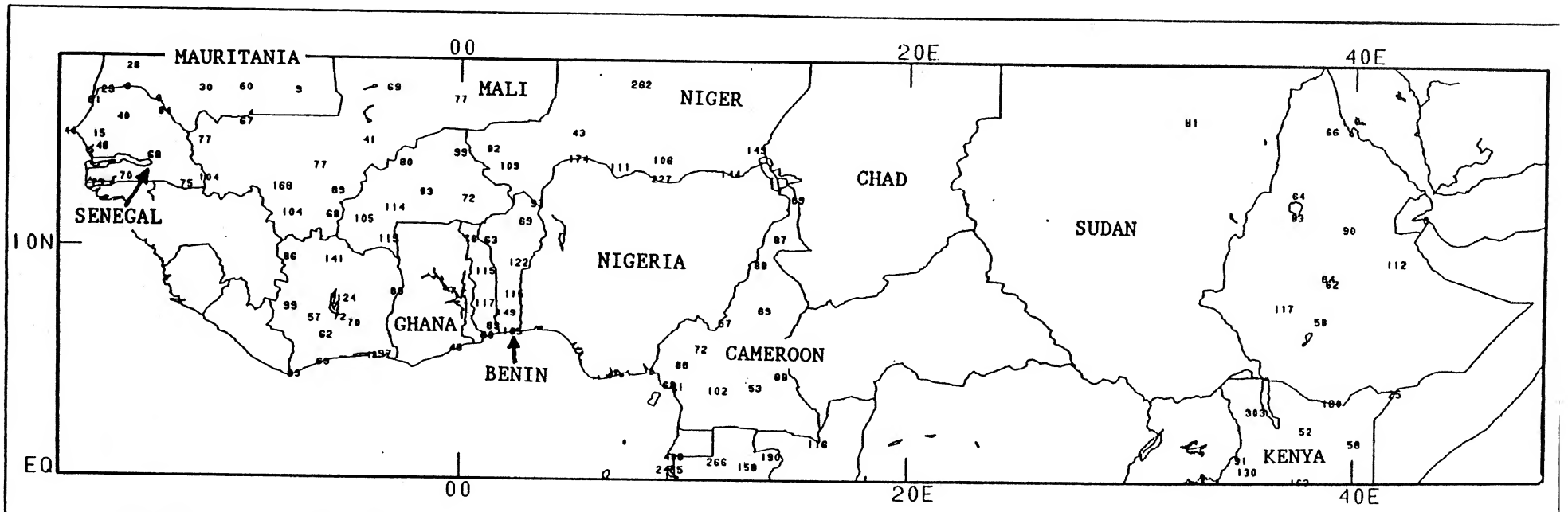
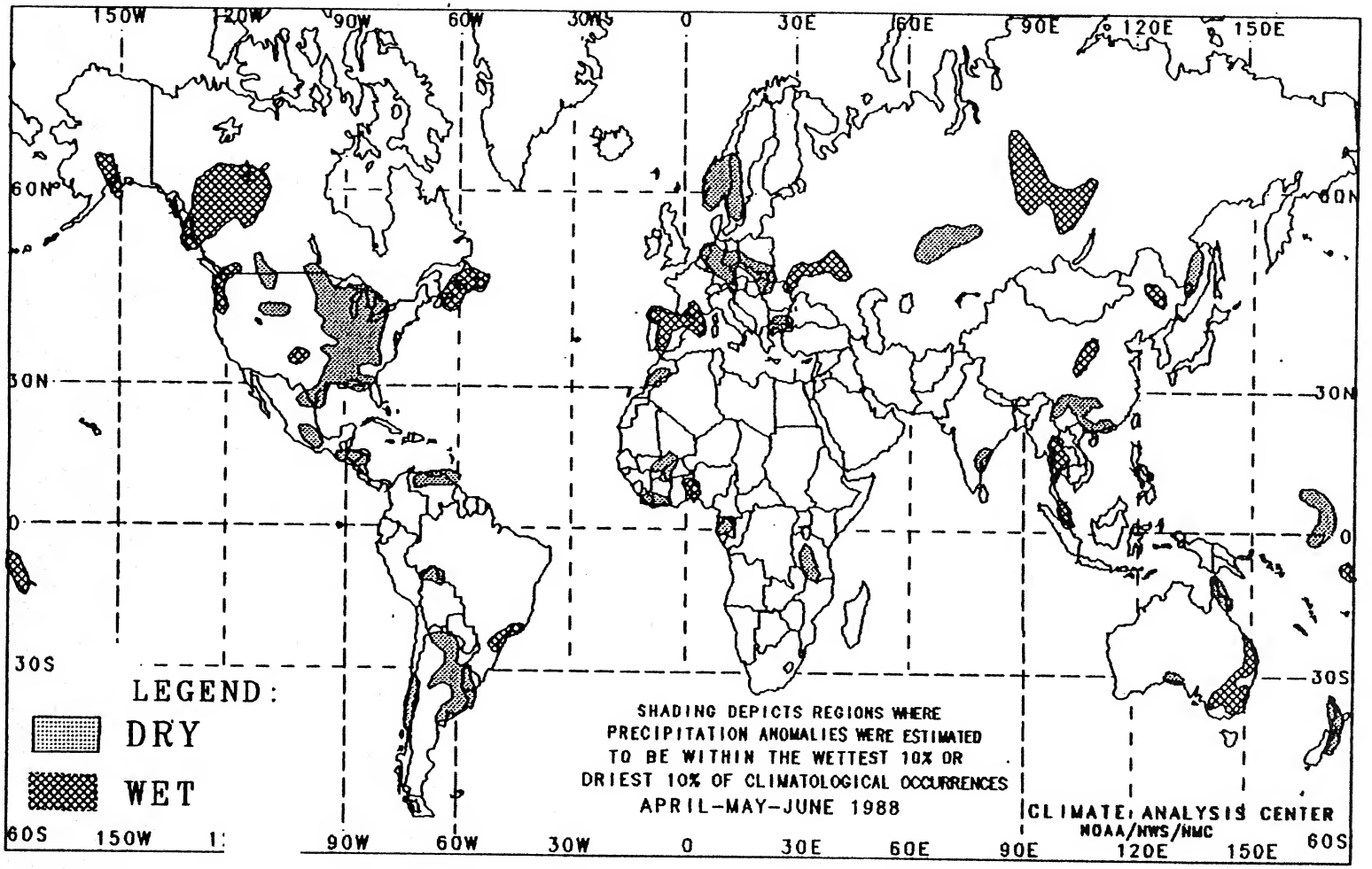


Figure 2. Percent of normal precipitation during 6/1-7/23/88. In contrast to the previous several years, many stations have measured above normal precipitation so far this season.

GLOBAL PRECIPITATION ANOMALIES

3 Month



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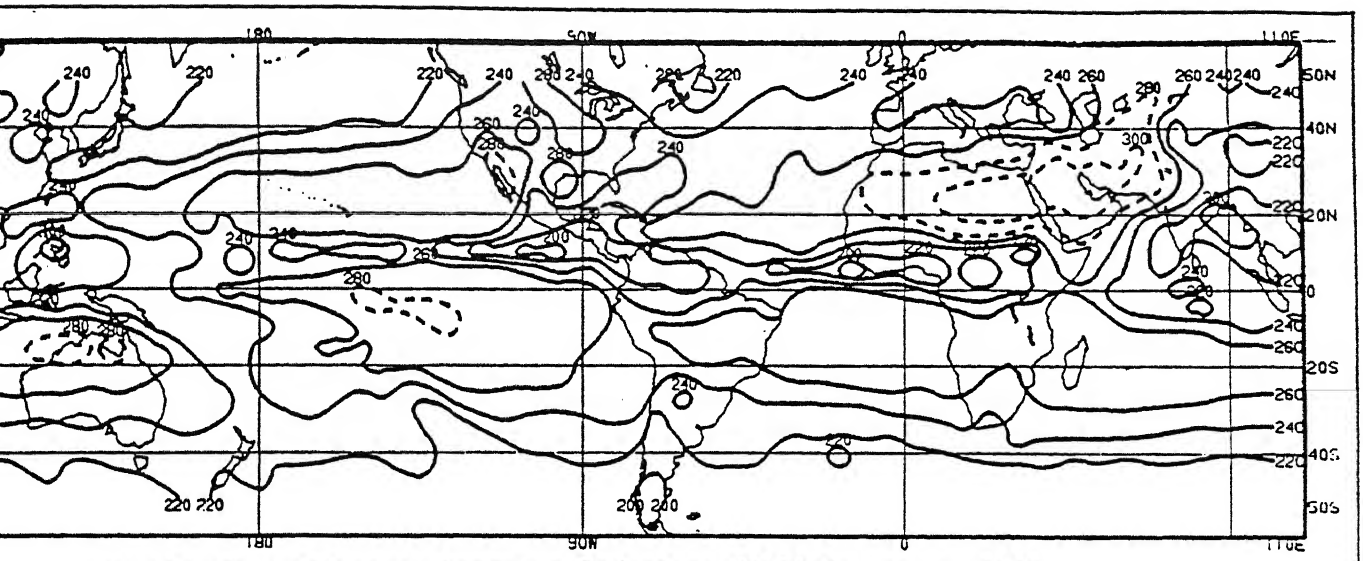
In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

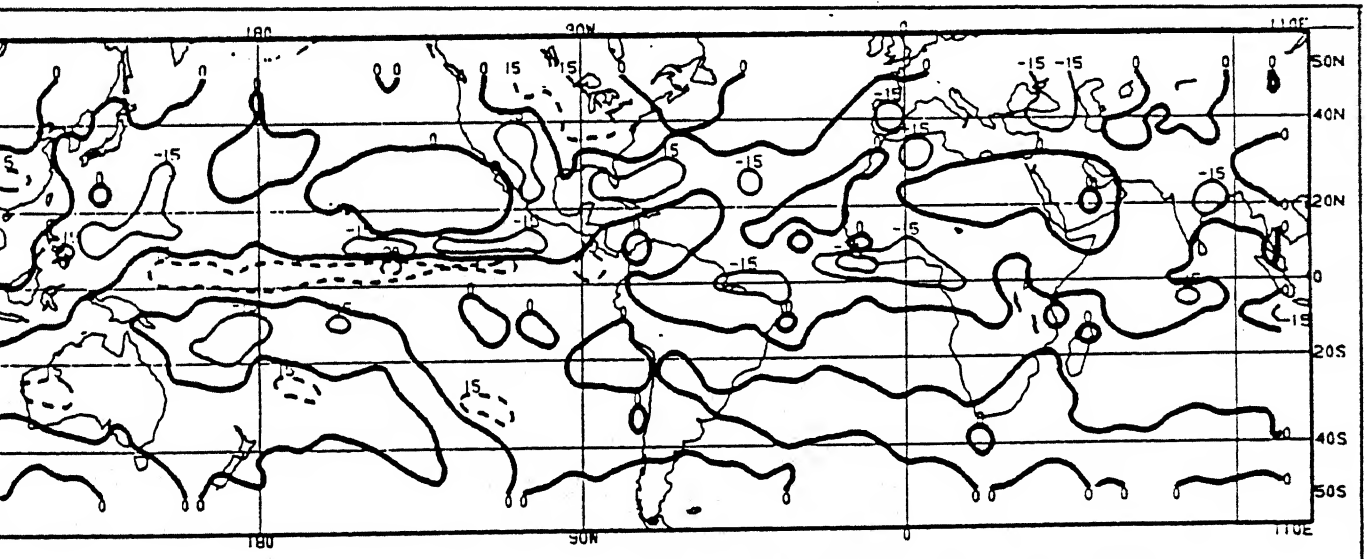
The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.



Monthly Mean Outgoing Longwave Radiation (OLR) for June, 1988.

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel ESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° mercator grid for display. our intervals are 20 Wm^{-2}, and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our oses 20°N-20°S) that receive primarily convective rainfall, a mean OLR value of less than 220 Wm^{-2} is ciated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally cates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, e much of the precipitation is non-convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and ipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1983 base period mean (1978 missing). Contour intervals are 15 Wm^{-2}, while positive anomalies ater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and tive anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) olid.



Monthly Mean Outgoing Longwave Radiation (OLR) Anomaly for June, 1988.